

REMARKS/ARGUMENTS

Reconsideration of this application in light of the above amendments and following comments is courteously solicited.

With regard to the rejection of claims 10 and 16 under 35 U.S.C. 112, first paragraph as set forth on Page 2 paragraph No. 3 of the examiner's action please be advised as follows. Applicants by the instant amendment have deleted the recitation to hydrogel. It is respectfully submitted that the deletion of "hydrogel" from claims 10 and 16 obviate the rejection under 35 U.S.C. 112, first paragraph.

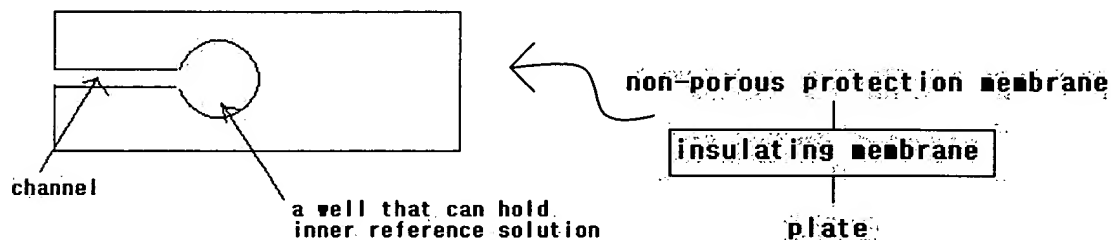
With regard to the confusion issue raised by the examiner on Page 2 paragraph No. 4 of his office action, Applicants have amended claim 10 in a manner which overcomes the examiner's objection. In this regard Applicants comment as follows.

According to the planar reference electrode of claim 10, the porous polymer is dissolved in the organic solvent to form porous polymer solution and the porous polymer solution is dispensed onto the inner reference solution to form the porous polymer membrane. Because the plate is formed of a material partially soluble in the organic solvent, the surface of the plate is unified to the porous polymer membrane when the porous polymer solution is dispensed on to the inner reference solution. That is, the porous polymer membrane is directly fixed to the plate without additional fixing element. Based on the above, claim 10 has been amended. To manufacture the planar reference electrode of claim 10, the plate should be formed of a material partially soluble in the organic solvent. For example, the plate can be formed of polycarbonate because it is soluble

in the organic solvent such as Tetrahydrofuran(Please refer to Example 8). Note that claim 3 depends on claim 16 and claim 12 depends on claim 10. Accordingly, alumina or glass is not used as plate material for the electrode of claim 10. In light of the foregoing, it is submitted that claim 10 as amended is definite.

With regard to the rejection to claim 16 and claim 17 employing the Suzuki et al. reference as the primary reference, Applicants respectfully requests the examiner to reconsider this rejoin in light of the following comments.

The most important technical feature distinguished from Suzuki et al. is the junction in a line of microcapillary. According to claim 16, silver paste is added at the electrode site and electrode connection part on the plate. An insulating membrane is cut out in a size that can cover the electrode site and then punched to form a well that can hold inner reference solution. A straight channel is made from one end of the well to the outer boundary.



The lower surface of the insulating membrane is attached on the plate to form an insulating layer. When the insulating layer is being formed on the electrode, the insulating layer is formed on the electrode except the first vacancy around the

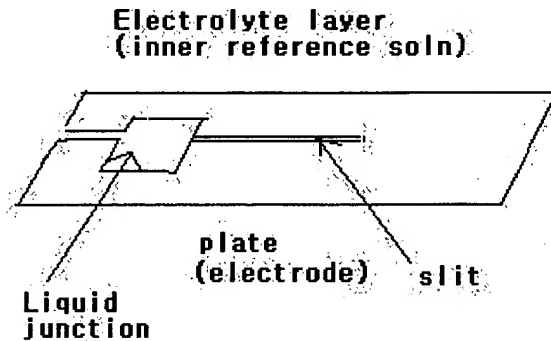
electrode(that is, the well) and the second vacancy(that is, the channel) on the electrode. And then inner reference solution is placed within the first vacancy around the electrode.

According to the present invention, since the inner reference solution is made of the viscous solution, the inner reference solution need not be hydrated and provide rapid activation while minimizing the contamination of sample solution due in part to the retarded diffusion of the inner reference electrolytes(the last paragraph of page 14 of the specification). Finally, the non-porous protection membrane is attached on the upper surface of the insulating membrane.

It is clear from the foregoing, **the lower and the upper portion of the channel is respectively covered with the plate and the channel to form a kind of microcapillary.**

Suzuki attempted to solve the technical problem of a liquid-junction reference electrode using the thin-film Ag/AgCl element and a concentrated KCl electrolyte solution. AgCl layer dissolves rapidly in a concentrated KCl solution forming a complex and thus is has been virtually impossible to fabricate a long-lived reference electrode. To extend the lifetime of the reference electrode, the entire surface of a silver layer was covered with a hydrophobic polymer layer and AgCl layer was grown only from a slit at the center. According to Fig 3. of Suzuki, a silver layer(Ag/AgCl) is formed on a substrate and then covered with a hydrophobic polyimide layer. A slit through which the electrolyte solution contacts with the silver-substrate is formed at the center of polyimide layer. In addition, the liquid junction is formed with an ENT-2000 resin by casting it into a recess formed in the polyimide layer and

curing it under a UV light. The electrolyte layer is with KCL, PVP and 2-propanol. And then, the entire layer is protected with a silicone rubber passivation.



As explained in the above, the Suzuki reference is drawn to a junction which employs a porous material (ENT-2000 resin) and not a line of microcapillary claimed (a form of recess). Whereas, as noted on page 13, lines 22-25 of the instant specification, by employing a line of microcapillary formed on the thin film, the reference electrode is not dependent on the type of junction forming material employed. The Suzuki patent fails to teach or discloses the claimed subject matter.

In summary, the junction of Suzuki is in a form of recess, not in a form of microcapillary. In addition, the junction of Suzuki is formed with an ENT-2000 resin, not a vacancy.

The secondary references applied by the Examiner, that is, the Kotani patent and the Cranny et al. document failed to cure the deficiencies noted above with regard to the Suzuki reference. Neither of these references teach a line of microcapillary as claimed in the claims as currently pending.

The reference electrode with such the microcapillary as claimed provides faster activation time since the junction needs not to be hydrated. In addition, it can be prepared conveniently due to simplicity of the junction-forming method(line 8~12 of page 14). For the reason described in the above, claim 16 and the claims that depend thereon(claims 7 and 17) are not obvious over the art.

An earnest and thorough attempt has been made by the undersigned to resolve the outstanding issues in this case and place same in condition for allowance. If the Examiner has any questions or feels that a telephone or personal interview would be helpful in resolving any outstanding issues which remain in this application after consideration of this amendment, the Examiner is courteously invited to telephone the undersigned and the same would be gratefully appreciated.

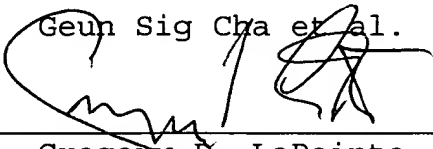
It is submitted that the claims as amended herein patentably define over the art relied on by the Examiner and early allowance of same is courteously solicited.

If any fees are required in connection with this case, it is respectfully requested that they be charged to Deposit Account No. 02-0184.

Respectfully submitted,

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I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313" on March 2, 2005.



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